DOCUMENT RESUME

ED 417 932 SE 061 142

AUTHOR Newman, Dianna L.; O'Connell, Raymond W.

TITLE An Evaluation of the Science Research in the High School Program: Year One Program Implementation.

INSTITUTION State Univ. of New York, Albany. Evaluation Consortium.

PUB DATE 1997-08-00

NOTE 54p.; Color photographs may not reproduce well. "Assisted by Maureen Singer, John Polnak, Lara Gordon, and Jamie Hudson."

AVAILABLE FROM Evaluation Consortium at Albany, Education B-28, University at Albany/SUNY, 1400 Washington Avenue, Albany, NY 12222; phone: 518-442-5027.

PUB TYPE Reports - Descriptive (141) -- Tests/Questionnaires (160)

EDRS PRICE MF01/PC03 Plus Postage.

DESCRIPTORS Futures (of Society); *Hands on Science; High Schools; Higher Education; *Partnerships in Education; Program Evaluation; *Relevance (Education); Science Activities; Science and Society; Science Curriculum; *Science Education; Scientific Methodology; Scientists

ABSTRACT

This document reports on the first year of a three year course of study for high school students in New York state known as the Science Research Program (SRP). SRP affords students the opportunity to conduct scientific research in conjunction with research scientists and professionals in the field. The program implementation incorporates the student as the primary initiator of research, the teacher as facilitator of the scientific method, and a scientist to serve as the student's research mentor. This evaluation explores four areas: (1) the effectiveness of teacher and student recruitment and retention efforts; (2) the effectiveness of the teacher training component of the program; (3) the process of program implementation during year one; and (4) the effectiveness of the program as defined by year one outcomes. Appendices include the teacher interview protocol, symposia observation form, and the assessment rubics. (DDR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

An Evaluation of the Science Research in the High School Program: Year One Program Implementation

ED 417 932

August , 1997

Principal Investigators
Dianna L. Newman, Ph.D.
Raymond W. O'Connell, Ed.D.

Project Co-Directors
Lucille A. Cardella, M.Ed.
Laura A. Zebrowski, M.S.
Ross Gubrud, M.A.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
D.L. Newman
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Assisted by: ***Maureen Singer, John Polnak, Lara Gordon, and Jamie Hudson.***

The Evaluation Consortium at Albany
Education B-28
University at Albany/SUNY
1400 Washington Avenue
Albany, New York 12222
(518) 442-5027

BEST COPY AVAILABLE

SCIENCE RESEARCH PROGRAM
EXECUTIVE SUMMARY
Year One

Evaluation Consortium
University at Albany, State University of New York
Albany, New York 12222

The Science Research Program is a unique three year course of study offered to high school students across New York State. The program affords students the opportunity to conduct scientific research in conjunction with research scientists and professionals in the field. The program implementation incorporates the student as the prime initiator of research, the teacher as the facilitator of the scientific method, and a scientist to serve as the student's research mentor. Students utilize communication technologies to facilitate their research.

As part of the first year implementation, the Evaluation Consortium at the University at Albany was asked to assist in conducting a formative evaluation of the Science Research Program. The purpose of the evaluation was to document stakeholders' perceptions of four areas: (1) the effectiveness of teacher and student recruitment and retention efforts; (2) the effectiveness of the teacher training component of the program; (3) the process of program implementation during year one; and (4) the effectiveness of the program as defined by year one outcomes. The evaluation team conducted interviews and surveys with students, teachers, and administrators. The following are the major findings of the first year of the program.

Effectiveness of Teacher and Student Recruitment and Retention Efforts

Teachers, administrators, and students offered their perceptions of the goals and purposes of the Science Research Program including:

- having students do the *process* of science; "to find out that science is a *verb* not just something that you know; you do science not just learn science,"
- having students gain in depth knowledge in a particular scientific area through independent and applied learning, and
- improving student work habits such as time management skills.

Perceptions of the recruitment and selection processes were as follows:

- the recruitment process generally included teacher presentations to science classes and was perceived as functioning adequately,
- the selection process ranged from simply enrolling students to formal application and interviews of students,
- generally students selected for the program had a range of ability levels,
- the most important student characteristics for selection were motivation and self-discipline, and

Across the program the average attrition was minimal; some reasons for attrition were that the program was more demanding than the student had anticipated and that the student did not come up with a testable hypothesis.

Effectiveness of the Training Component

The majority of the teachers reported that the training was outstanding. Their perceptions of the most useful aspects of the three week summer training were:

- the hands-on approach to learn how to evaluate and facilitate the course components, and
- the training manual and portfolio method of evaluation.

Teachers listed areas in which more information would be helpful including:

- using DIALOG,
- assisting students with time management,
- aiding in the student-mentor relationship,
- utilizing basic statistics,
- assisting students in reading journal articles, and
- organizing the symposium.

A majority of teachers found that the support groups were helpful. Teachers perceived the most useful aspects of the ongoing support groups were:

- gaining feedback on how to solve specific problems, and
- networking for mentors and journals.

Suggested changes for the support groups included:

- shifting to topic specific meetings in which participants could learn specific techniques, and
- increasing time spent interacting with other teachers, e.g. a professional day.

Program Implementation

Students reported on the following positive aspects of their participation in the SRP:

- experiencing a sense of accomplishment,
- finding helpful resources (e.g. journal articles, experts, and mentors), and
- gaining recognition for efforts.

Students perceived that the following tasks were easy to master:

- finding articles with DIALOG,
- giving oral presentations after constructive feedback, and
- writing a literature review.

Assistance which the students indicated made tasks easier was:

- being surrounded by others that did them earlier, and
- having set guidelines.

Students found the following tasks frustrating and/or difficult:

- finding articles due to inaccessibility to a university library or difficulty with interlibrary loan,
- contacting authors of journal articles, finding a mentor, and locating a research facility,
- creating 5 timelines and completing tasks on time especially for the symposium,

- generating a testable hypothesis (47% reported a high level of support in this area),
- giving the first oral presentation (56% reported a high level of support in this area), and
- reading dense journal articles without sufficient background knowledge

Students desired additional assistance in:

- obtaining background information in order to better understand journal articles (33% reported a high level of support in this area),
- finding a mentor (31% reported a high level of support in this area),
- managing deadlines (33% reported a high level of support in this area), and
- sustaining motivation when the work gets exceptionally difficult.

Teachers offered the following feedback on what facilitates program implementation:

- having sufficient preparation time,
- maintaining support from administrators, parents, and program administrators,
- maintaining the district's financial support, and
- having other teachers and the librarian available to assist students.

Teachers indicated that the following were barriers to program implementation:

- having inadequate library resources,
- lack of necessary communication systems in the classroom (e.g. DIALOG, telephone),
- insufficient time scheduled for program (some teachers lack a modified workload), and
- lack of support from others in the science department.

Teachers commented on the degree of support for the SRP received from various sources:

- 100% reported sufficient to a high degree of support from administrators,
- 56% reported adequate support from other science teachers,
- 100% reported a high degree of support from the parents of their students, and
- half of the teachers interviewed reported that the community was unaware of SRP.

Year One Outcomes

A number of positive outcomes support the effectiveness of the SRP in its first year of implementation in the various school districts.

The frequency of student progress assessment ranged from bimonthly to four times per semester. Teachers reported utilizing the following methods of assessment:

- student-teacher conference using rating sheets provided in workshop,
- peer evaluation of oral presentations using rating sheets provided in workshop,
- day to day supervision of student time management, and
- portfolio review.

Teachers, administrators, and students identified the following skills to be improved as a result of participation in the SRP:

- reading for meaning,
- writing a report and/or abstract,
- organizing and planning,
- communicating effectively orally,
- using technology effectively, and
- interpreting data.

Students were reported to improve in the following:

- knowledge of conducting scientific research, and
- knowledge of science.

Reviews of student portfolios yielded the following observations:

- the completion of the lab notebook, goals sheets, abstracts, and the e-mail and DIALOG logs were highly variable among the schools,
- 87% of the portfolios included articles from *primary* sources as required by the SRP,
- telephone and meeting logs were minimally completed,
- student presentations were a major component of the portfolio including notes, graphics, and completed peer review forms,
- no students had entries in the grants section, and
- few students included the rules for competitions as part of their portfolios.

Observations of symposia yielded the following:

- every student presented a poster with word processed information and graphic analyses of the six sections of the scientific method,
- students gave oral presentations of a literature review and/or experimental findings lasting fifteen minutes; in some schools, every student gave an oral presentation,
- over half of the students synthesized several scientific journal articles in their literature review, and
- each symposium included welcoming remarks and a keynote address.

Administrators perceived that the SRP fit in with New York State Education Standards in the following ways:

- meeting the Math, Science, and Technology initiative,
- obtaining Regents credit as an additional science elective rather than a replacement science course, and
- meeting the research component of the standards.

One hundred percent of the administrators and teachers advocated for the long term viability of the SRP. All noted that the program assisted students in enhancing cognitive skills and work habits as well as providing a broader range of curriculum options to students.

Table of Contents

	Page
Introduction	1
Methodology	2
Evaluation findings	2
Objective 1: Recruitment and Retention	2
Initial perceptions of the educational goals of the SRP	2
Appropriate student candidates for the SRP	3
Student recruitment and reasons for joining the SRP	3
Teacher recruitment	3
Objective 2: Teacher Training and Support	5
Effectiveness of summer training workshop	5
Effectiveness of teacher support groups	5
Objective 3: Program Implementation During Year One	6
Student perceptions of joys and frustrations	7
Student relationships with teachers and mentors	7
Teacher perceptions of supports, barriers and student needs	10
Objective 4: Effectiveness and Outcomes of Year One	10
Teacher methods of student assessment	10
Perceptions of student outcomes and skills gained	11
Portfolio review and student outcomes	13
Symposia review and student outcomes	14
Perceptions of changes to the educational system	15

Appendices

Appendix A Student, Teacher and Administrator Surveys
Appendix B Student, Teacher and Administrator Interview Protocols
Appendix C Symposia Observation Form
Appendix D Cover Letter for Surveys and Confirmation Letter for Site Visits
Appendix E Assessment Rubrics
Appendix F Documentation Checklist and Demographic Profiles

Introduction

The year one evaluation of the Science Research Program (SRP) focused on issues related to teacher training, implementation of year one academic activities, and documentation of year one outcomes. Specific evaluation objectives and questions are as follows:

Objective One: To assess the effectiveness of teacher and student recruitment and retention efforts. Specifically to address the following:

1. What are the initial perceptions of the educational goals of the SRP?
2. For whom is the program considered appropriate?
3. How are students recruited and why do they join?
4. How does student attrition impact the SRP and what retention efforts are made? and
5. How are teachers recruited?

Objective Two: To assess the effectiveness of the teacher training component of the program. Specifically to address the following:

1. How effective is the summer training workshop? and
2. How effective are the teacher support groups?

Objective Three: To assess the process of program implementation during year one. Specifically to address the following:

1. How did students perceive the initial year of the SRP including joys and frustrations and relationships with teachers and mentors? and
2. How did teachers perceive the process of implementing SRP during year one, including supports and barriers to implementation, and student needs?

Objective Four: To assess the effectiveness of the program as evidenced by year one outcomes. Specifically to address the following areas:

1. What methods are teachers using for student assessment?
2. What are the perceived outcomes of students participation in the SRP and what skills are being mastered?
3. Does a review of student portfolios support perceptions of student outcomes?
4. Does a review of student symposia support perceptions of student outcomes?
5. What are the perceived changes to the educational system as a result of implementing the SRP?

Methodology

Eight schools in their first or second year of Science Research Program implementation were visited by the evaluation team. The eight schools represented a cross-section of urban, suburban, and rural districts. District enrollment ranged from 481 to 5716 students. Enrollment in the Science Research Program ranged from 4 to 34 students.

While on site, individual interviews were conducted with the Science Research teachers, administrators, and students. The eight administrators interviewed consisted of central administrators, science department heads, and building administrators. Sophomore, junior and senior students were interviewed in groups. A random sample of student portfolios were also examined at each site.

In addition to site visits, surveys were mailed to 17 schools offering the Science Research Program. Students, teachers, and administrators from 11 of these schools responded. Eight of these 11 schools were also site visit schools. Three symposia were attended by evaluators.

Following are the results of the Year One evaluation. The information collected is summarized under specific objective questions within objectives:

Objective One:
Effectiveness of teacher and student recruitment and retention efforts

Perceptions of the Goals and Purpose of the SRP

Teachers, students, and administrators were asked during interviews what they perceived the goals and/or purposes of the program to be. The perceptions of the three stakeholder groups were coordinated with the goals outlined by the project directors.

Academic
- to have students perform the *process* of science; "to find out that science is a verb, not just something that you know; you *do* science, not just learn science,"
- to learn how to become a scientist by framing a question, making observations, assimilating information, and drawing conclusions,
- to gain depth of knowledge in a particular area through real life application of learning,
- to improve reading, writing, and oral presentation skills, and
- to prepare for college and obtain college credit.

Work Habits
- to learn time management skills, and
- to be self-driven.

Personal
- to improve self-confidence,
- to gain autonomy in learning,
- to create a sense of accomplishment in students,
- to gain an open mind,
- to learn to accept an incorrect hypothesis, and
- "to create an informed citizenry and develop the confidence to ask a question and find the answer to it."

Teachers cited the following as *key components* of the SRP:

- the use of the scientific method in a broader way than in a preestablished lab that is directed to one right answer, and
- the gaining of depth over breadth in studying a scientific topic.

Perceptions of the Population Served

Teachers, students, and administrators were asked to describe the type of student best served by the SRP. They described the students as:

- a broad range of students, usually the higher caliber students,
- highly motivated and self-disciplined,
- having a genuine interest in a scientific topic, and
- willing to find out their own answers and take risks; e.g. " an attitude of wanting to do rather than what do I need to know to get an A"

Recruitment and Selection of Students and Teachers

Students, teachers, and administrators consistently reported general satisfaction regarding the student recruitment and selection process. Table 1 summarizes their perceptions.

Table 1.
Selection and Recruitment Process

	Teacher Responses %:				Administrator Responses %:			
Process	**Working Well**	**Adequate**	**Needs Extra Work**	**Not Area of Emphasis**	**Working Well**	**Adequate**	**Needs Extra Work**	**Not Area of Emphasis**
Recruitment of teacher into the program	56	0	11	33	50	30	0	20
Identification of prospective students for the program	11	56	33	0	50	30	20	0
Spring recruitment meeting Freshman year	11	33	44	11	30	30	40	0
Student application process	11	33	44	11	NA*	NA	NA	NA
Fall meeting with students	44	33	0	0	30	70	0	0
Process of retaining students in program	44	44	11	0	40	50	10	0

*NA = Not asked

The recruitment process was perceived as functioning adequately. Specific findings derived from qualitative and quantitative data are as follows:

Recruitment

- in three-quarters of the schools visited, the SRP teacher briefly presented the program to students in other science classes,
- of those presentations, the overwhelming majority were made to all levels of students and some were made to honors students only,

Teachers cited the following as *key components* of the SRP:

- the use of the scientific method in a broader way than in a preestablished lab that is directed to one right answer, and
- the gaining of depth over breadth in studying a scientific topic.

Perceptions of the Population Served

Teachers, students, and administrators were asked to describe the type of student best served by the SRP. They described the students as:

- a broad range of students, usually the higher caliber students,
- highly motivated and self-disciplined,
- having a genuine interest in a scientific topic, and
- willing to find out their own answers and take risks; e.g. " an attitude of wanting to do rather than what do I need to know to get an A"

Recruitment and Selection of Students and Teachers

Students, teachers, and administrators consistently reported general satisfaction regarding the student recruitment and selection process. Table 1 summarizes their perceptions.

Table 1.
Selection and Recruitment Process

	Teacher Responses %:				Administrator Responses %:			
Process	**Working Well**	**Adequate**	**Needs Extra Work**	**Not Area of Emphasis**	**Working Well**	**Adequate**	**Needs Extra Work**	**Not Area of Emphasis**
Recruitment of teacher into the program	56	0	11	33	50	30	0	20
Identification of prospective students for the program	11	56	33	0	50	30	20	0
Spring recruitment meeting Freshman year	11	33	44	11	30	30	40	0
Student application process	11	33	44	11	NA*	NA	NA	NA
Fall meeting with students	44	33	0	0	30	70	0	0
Process of retaining students in program	44	44	11	0	40	50	10	0

*NA = Not asked

The recruitment process was perceived as functioning adequately. Specific findings derived from qualitative and quantitative data are as follows:

Recruitment

- in three-quarters of the schools visited, the SRP teacher briefly presented the program to students in other science classes,
- of those presentations, the overwhelming majority were made to all levels of students and some were made to honors students only,

teachers because of their excellent scholarship, teaching skills, research experience, and/or superior human relations. Administrators and teachers are highly satisfied with the teacher recruitment process.

Objective Two: Effectiveness of the Teacher Training Component

Summer Training Workshop

One year after the training, the teachers were asked to offer feedback on the utility of training and support efforts offered by the program. Table 2 provides a summary of the data.

Table 2
Teachers' Perceptions of Support Provided by Training and Support Group Meetings

Support	Outstanding %	Sufficient %	Insufficient/ No Support %
Orientation sessions	22	63	13
Summer training session	88	13	0
Support group meetings	13	63	25

Eighty-eight percent of the teachers reported that the training was outstanding. Examination of the quantitative and qualitative data indicate the following:

Most useful aspects of the summer training workshops
- hands-on activities which increase the teacher's understanding of the student experience, evaluating the portfolio, and
- emphasizing the scientific method as the center of the curriculum.

Areas in which more information would be helpful
- using DIALOG,
- organizing the symposium,
- teaching students to read journals,
  managing time, especially with students starting the SRP in their junior or senior year,
- assisting with the mentor relationship, and
- conducting basic statistics.

Changes in format or content suggested
- increasing time for teachers to put together their presentations,
- adapting SRP to students of differing reading and writing skills,
- altering documentation of first year activities from lab book method.

Teacher Support Groups

The support groups were designed to include status reports on program implementation and student attainment, the sharing of successful teaching practices, and the sharing of problems and solutions. Sixty-three percent thought that the support groups provided adequate support while 13% found the level of support to be outstanding. Specifically, teachers indicated the following:

Most useful aspects of the support groups
- gaining feedback on how to solve specific problems, and
- networking for mentors and journals.

Areas in which more information would be helpful
- organizing the symposium, and
- sharing information and ideas.

Changes in format or content suggested
- a shift to topic specific meetings was desired by the vast majority of interviewees in order to learn specific tools or techniques,
- less time spent reporting on progress,
- more time to interact with other teachers e.g. a professional day, and
- better facilitation of the meetings so that participants stay focused on the SRP model.

Objective Three: Process of Program Implementation

Seven of the eight site visit schools responded to a sixteen question checklist that addresses the main aspects of a successful program. These findings are summarized in Table 3.

Table 3
SRP Implementation Success Checklist

Goal	Yes %	No %	Not Applicable%
Spring meeting with prospective students	86	14	0
Midyear list of prospective students	57	43	1
Teacher availability in summer	86	14	0
Ten articles read by start of school	100	0	0
Five biweekly assessments per quarter	71	29	0
Student-teacher conferences by week three	100	0	0
Students complete three DIALOG searches	71	29	0
Prospective mentor contact by April	57	43	0
Students know role in Symposium by April	86	14	0
All student portfolio section kept up	43	57	0
Opportunities for out of class presentations	71	29	0
Students attended available symposia	100	0	0
Students produced quality poster by year one	100	0	0
Second and third year students get college credit	43	14	43
Second and Third year students enter competitions	71	0	29
Students participated in symposium	86	14	0

BEST COPY AVAILABLE

Specific findings include the following:

- the basic components of the SRP were generally met at all reporting sites,
- recruitment procedures vary from the recommended procedures,
- 100% of students read 10 articles prior to the beginning of the school year,
- greater attention may need to be directed toward the maintenance of the student portfolio,
- every school held an annual symposium in which each student produced a poster,
- 100% of students took advantage of opportunities to attend available science symposia and presentations including attending a neighboring school's symposium,
- 57% of students attempted to procure a mentor by April in the first year of the course,
- the intended assessment process appears to be in place, and
- 71% of second and third year students entered competitions.

Student Perceptions

Students were asked to comment on the joys and frustrations that they experienced conducting research as well as the aspects of the program that were easy or difficult to master.

Joys

- experiencing a sense of accomplishment,
- finding helpful resources, and
- gaining recognition for efforts.

Tasks that were easy to master

- finding articles with DIALOG,
- oral presentations after constructive feedback, and
- literature review.

What made tasks easier

- being surrounded by others that did them previously, and
- having set guidelines.

Frustrations

- finding articles via interlibrary loan and DIALOG,
- contacting authors of journal articles and finding a mentor,
- getting tasks done on time especially for the symposium, and
- scheduling conflicts with other courses or activities.

Tasks that were difficult

- generating a testable hypothesis,
- the first presentation of an article,
- reading dense journal articles without sufficient background knowledge,
- establishing a mentor relationship, and
- locating a research facility.

Students also commented on their relationships with their teachers and their mentors during their sophomore and junior years. Tables 4 and 5 present perceptions of support from teachers and mentors for both sophomore and junior students.

Table 4
Students' Reported Level of Support Received from Teachers and Mentors During Their Sophomore Year

	Teacher Support %				Mentor Support %			
Sophomore Year	**High**	**Average**	**Low**	**Not Applicable**	**High**	**Average**	**Low**	**Not Applicable**
Mastering DIALOG computer searches	46	29	3	22	1	2	2	95
Locating and retrieving 20 articles using DIALOG	33	31	11	11	0	4	1	95
Presenting one of the 20 articles to class	56	26	2	16	3	4	1	92
Developing statement of intended research	47	29	7	17	15	7	4	74
Contacting author(s) of retrieved articles to begin mentor relationship	33	22	9	36	5	2	5	88
Locating a research facility	31	15	6	48	12	6	1	81
Creating five timelines	31	26	11	32	2	4	3	91
Creating posterboard detailing intended research and initial findings	56	22	5	17	6	6	2	86
Beginning research	54	17	4	4	18	4	2	76

BEST COPY AVAILABLE

Table 5
Students' Reported Level of Support Received from Teachers and Mentors During Their Junior Year (Accelerated Work)

	Teacher Support %				Mentor Support %			
Junior Year	**High**	**Average**	**Low**	**Not Applicable**	**High**	**Average**	**Low**	**Not Applicable**
Sustaining bi-monthly communication with mentor	12	6	2	80	8	4	3	85
Continuing literature reviews at a rate of approximately 20/year	11	12	3	74	6	1	4	89
Redefining hypothesis based on literature	17	5	3	75	9	5	3	83
Presenting findings to teacher, the class, and school community	20	4	4	72	5	5	2	88
Orientation to statistical software	8	3	3	86	3	2	2	93
Constructing five time lines	8	7	7	78	0	1	2	97

They noted the types of assistance received from the teacher.

Academic
- suggested research tools, methods, and focus,
- defined vocabulary terms and provided scientific knowledge in translating a journal article,
- assisted in finding a mentor (33% of students reported a high level of support in this area),
- 56% reported getting a high level of support in oral presentations, and
- 47% reported getting a high level of support in generating a testable hypothesis.

Work Habits
- helped with time management (31% of students reported a high level of teacher support).

Personal
- supportive and understanding of frustration.

Students also commented on the additional assistance that the teacher could provide:
Academic
- finding a mentor,
- helping with the writing of the paper, and
- providing more background information on their topic.

Work Habits
- managing deadlines.

BEST COPY AVAILABLE

Personal
- providing encouragement when the work gets difficult.

Students noted the types of assistance received from the mentor.
Academic
- designing the experiment,
- explaining theory, background, terminology, and
- providing constructive criticism on the paper and presentation.

Personal Support
- encouraging the student, and
- attending the symposium.

Students reported on the additional assistance that the mentor could provide:
Academic
- designing the experiment,
- analyzing data statistically, and
- gauging whether student has sufficient information for the project.

In general, mentors were not reported to be providing a high level of support. This finding may be confounded by the fact that most students do not have mentors in this point of their research.

Teacher Perceptions

The eight teachers offered feedback on what facilitates and what impedes program implementation. Listed below are factors which facilitate program implementation.
- having sufficient preparation time,
- maintaining support of administrators, parents, and program administrators,
- maintaining district's financial support, and
- gaining the support of other teachers and librarians in assisting students.

The following factors impede program implementation:
Inadequate resources/support
- inadequate library resources: interlibrary loan is insufficient; not near university library,
- lack of communication systems in the classroom (e.g. telephone, DIALOG),
- insufficient time scheduled for the program, and
- inadequate support from colleagues in the science department

The Science Research Program recommended that teachers be assigned four course workloads, however, that was not the case for some of the schools visited. In addition, in classroom communication systems were not present in some schools as recommended by the proposal.

Objective Four: Outcomes

A number of positive outcomes were reported by students, teachers, and administrators which supported the effectiveness of the SRP in its first year of implementation. These included utilization of alternative means of assessment, student outcomes, and systems outcomes.

Assessment

Teachers reported implementation of suggested modes of alternate assessment. Findings include:

Frequency
- some assessed student progress 3 to 4 times per semester, and
- a few of the teachers conducted bimonthly evaluations.

Assessment Activities
- student-teacher conference using rating sheets provided in the summer training workshop,
- peer evaluation of oral presentations,
- day to day time management supervision, and
- review of entire portfolio.

Student Outcomes

The students, teachers, and administrators outlined many programmatic benefits to students. These findings are summarized in Tables 5 and 6.

Table 6
Agreement of Presence of Recognized Outcomes of the SRP: Percentage of Teachers, Administrators, and Students Perceiving the Outcome to be Present

	Teacher %	Administrator %	Student %
The program has improved knowledge about conducting science research	100	100	99
The program has increased knowledge about science	100	100	97
The program is interesting to me	100	100	98
The program has helped to improve:			
creative thinking ability	100	100	96
problem solving skills	100	100	97
communication skills	100	100	98
time management skills	100	90	92
Due to the program, motivation for learning has increased for:			
science	88	100	95
other school subjects	51	70	82
Self-esteem has increased	100	100	86
The class size is good	100	100	94
The program challenges	100	100	99
The Program has changed the concept of science education	75	80	NA*
I support continuation of the program	100	100	NA

*NA = Not Asked

Table 7
Teacher, Administrator and Student Perceptions of Skills Acquired by Students in the SRP

Skill	Student %	Teacher %	Admin%
Reading for meaning	85	100	91
Problem solving	68	75	82
Reasoning skills	70	88	73
Writing a report/abstract	89	100	82
Organization and planning skills	85	88	73
Thinking creatively	63	63	27
Communicating effectively orally	89	100	82
Communicating effectively in writing	68	100	82
Identifying the difference between a fact and an opinion	46	88	73
Making an inference	63	75	64
Anticipating possible problems and finding the solution	71	50	45
Effective use of technology	81	88	91
Interpretation of data	81	88	73
Outlining or notetaking	81	50	82
Summarizing or paraphrasing	72	63	82
Collecting data	56	75	55
Reading graphs and charts	71	100	91
Time management	71	88	64
Real life application of science	72	88	91

At least 80% of each of the three stakeholder groups believed that the following skills were enhanced by the SRP:

Academic
- reading for meaning,
- writing a report and/or abstract,
- effective oral communication, and
- effective use of technology.

In addition, the vast majority of the three stakeholder groups strongly agreed that the students':
- knowledge of conducting scientific research improved, and
- knowledge of science improved.

Comments generated during the interviews offered additional academic student outcomes such as:
- meaningful, in-depth learning of an individualized topic that motivates the student,
- knowledge of how to digest and relate information from literature,
- accrual of critical thinking skills, and

Table 7
Teacher, Administrator and Student Perceptions of Skills Acquired by Students in the SRP

Skill	Student %	Teacher %	Admin%
Reading for meaning	85	100	91
Problem solving	68	75	82
Reasoning skills	70	88	73
Writing a report abstract	89	100	82
Organization and planning skills	85	88	73
Thinking creatively	63	63	27
Communicating effectively orally	89	100	82
Communicating effectively in writing	68	100	82
Identifying the difference between a fact and an opinion	46	88	73
Making an inference	63	75	64
Anticipating possible problems and finding the solution	71	50	45
Effective use of technology	81	88	91
Interpretation of data	81	88	73
Outlining or notetaking	81	50	82
Summarizing or paraphrasing	72	63	82
Collecting data	56	75	55
Reading graphs and charts	71	100	91
Time management	71	88	64
Real life application of science	72	88	91

At least 80% of each of the three stakeholder groups believed that the following skills were enhanced by the SRP:

Academic
- reading for meaning,
- writing a report and/or abstract,
- effective oral communication, and
- effective use of technology.

In addition, the vast majority of the three stakeholder groups strongly agreed that the students':
- knowledge of conducting scientific research improved, and
- knowledge of science improved.

Comments generated during the interviews offered additional academic student outcomes such as:
- meaningful, in-depth learning of an individualized topic that motivates the student,
- knowledge of how to digest and relate information from literature,
- accrual of critical thinking skills, and

- students had no entries in the grants and essays sections,
- few had rules for competitions as part of their portfolios, and
- most students did not have final papers because they are not at that stage of their research being mostly sophomores and juniors.

Table 8
Percent of Portfolios Reviewed with Content Present

Contents	None	Minimal	Normative	Superior	Not Applicable
Lab notebook	38	13	6	44	0
Goal sheets	19	6	31	44	0
e-mail log, DIALOG log	13	19	31	38	0
Journal articles	6	0	50	44	0
Telephone log	50	44	0	0	6
Meetings log	56	44	0	0	0
Assessment	25	0	44	31	0
Grants	100	0	0	0	0
Presentations	6	13	25	56	0
Honors and Awards	44	0	25	31	0
Abstracts	44	0	19	38	0
Final paper	0	0	0	13	88
Rules for competitions	69	0	32	0	0
Log of time commitments	32	0	4	32	0
Essay on excellence	100	0	0	0	0
Essay on research direction	100	0	0	0	0

Symposium Observations

Three symposia conducted by students in their first year of the program were observed by evaluators. The students presented an extremely diverse range of topics in the natural and social sciences.

Presentation Format

- the symposia were attended by 25 to 60 people,
- each symposium included welcoming remarks and a keynote address,
- students received awards and certificates,
- students gave oral presentations lasting fifteen minutes,
- all students used graphic representations in their presentations,
- the total group of presentations clearly conveyed the purpose, materials, methods, results, discussions, and conclusions of the literature reviewed and/or the experiments performed by the students,
- the quantity and quality of journals synthesized in the literature reviews were variable,
- over half of the students synthesized several scientific journal articles in their literature review, the remaining reviewed only one article and/or utilized anecdotal or nonprimary sources, and
- two symposia included question and answer sessions with the audience.

Poster Format

- every student presented a poster,

- wordprocessed information and graphic analyses were attached to the showboards, and
- the total group of presentations clearly conveyed the purpose, materials, methods, results, discussions, and conclusions of the literature reviewed and/or the experiments performed by the students.

Creativity was displayed in the symposia. Programs printed on heat sensitive paper were handed to audience members in one symposium. Students handed out business cards with their name, telephone number, e-mail address, and topic in another symposium. Please refer to photographs in the Appendix.

System Outcomes

Teachers commented on the degree of support received from various sources in implementing the program that is highlighted below. Table 9 presents a summary of teacher responses.

Table 9
Teacher and Administrator Perceptions of Changes Made and Supports Received from Various Organizations

	Teacher Responses %			Administrator Responses %		
Support	**Outstanding**	**Sufficient**	**Insufficient/ NoSupport**	**Outstanding**	**Sufficient**	**Insufficient/ No Support**
Adjustment of Teacher Load	33	22	44	45	45	5
Establishment of communication networks	0	44	56	45	55	0
Teacher computer for DIALOG, e-mail and Internet	22	33	44	55	45	0
Long distance phone line	22	33	44	55	45	0
Course list in course catelog	56	44	0	88	13	0
Support from other teachers	22	56	22	45	36	18
Support from school counselors	0	100	0	45	45	9
Support from administrators	78	22	0	72	27	0
Support from mentors in the community	25	38	38	45	36	18
Support from parents	50	50	0	56	44	0
Support from school board	NA*	NA	NA	73	27	0
Support from State Education	NA	NA	NA	25	50	25

*NA = Not Asked

- 99% reported support from administrators,
- 85% reported support from other science teachers,
- 100% reported a high degree of support from parents of their students,
- Half of teachers interviewed reported that the community was unaware of the SRP,
- 100% of administrators reported support from school boards, and
- 88% of administrators reported that the course was listed in the course catalog.

Administrators remarked on the advantages and drawbacks to having a SRP in their school.

Advantages
- the students learn self-discipline and responsibility,
- students may eventually engage in research as a career,
- the teacher is not burdened by needing an expertise in a particular subject area,
- the program assists in improving students reading and communication skills, and
- the skills in the program translate to all academic areas.

Disadvantages
- SRP does not reach enough students, yet it is too high level work to involve many students,
- scheduling is difficult, particularly in smaller schools; it conflicts with many electives, and
- SRP may not foster individual experimentation quickly enough.

Administrators and teachers indicated their perceptions of changes and supports put into place to implement the program.

Administratrators' perceptions of supports
- most schools reported that the course is in the program of studies; some schools conduct the program after school so it is not currently in the program of studies,
- most purchased minimal supplies and made budget changes,
- many purchased lab equipment, journals, laptops, or software,
- some added a telephone line,
- some added DIALOG/Internet account,
- in a few schools, other teachers supplemented science research with their own expertise, e.g. a mini-course in statistics, and
- buses provided for field trips to the library.

Teachers' and administrators' perceptions of the supports provided stood in sharp contrast.

Teachers' perceptions of supports
- reported insufficient to no adjustment of the teacher load, and
- report insufficient establishment of communication networks (e.g. having a teacher computer for DIALOG, long distance telephone line, etc.).

Administrators reflected on the program's impact on the overall science curriculum:
- stated that it was an expansion or addition in research exposure,
- viewed students as curriculum experts in other science curriculums and saw it as an opportunity to transfer knowledge to other courses, and
- reported that students continue to participate in the Regents curriculum which is driven by New York State Education Department.

Administrators differentiated this course from other science courses because:
- a body of knowledge is acquired through research rather than memorization of facts,
- students work independently and are responsible for individual progress,
- it is a more hands-on approach and a real life application of science,

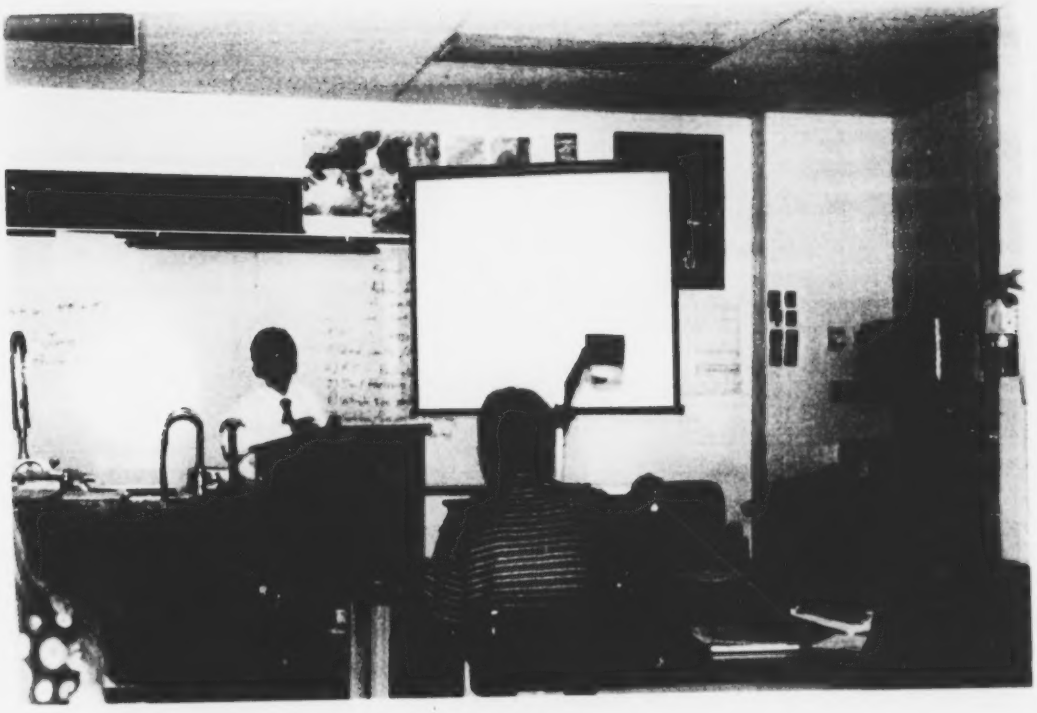
- the teacher is a facilitator; "the director of education not the giver of information,"
- technology is integrated in a sustained fashion, and
- students learn to communicate effectively orally.

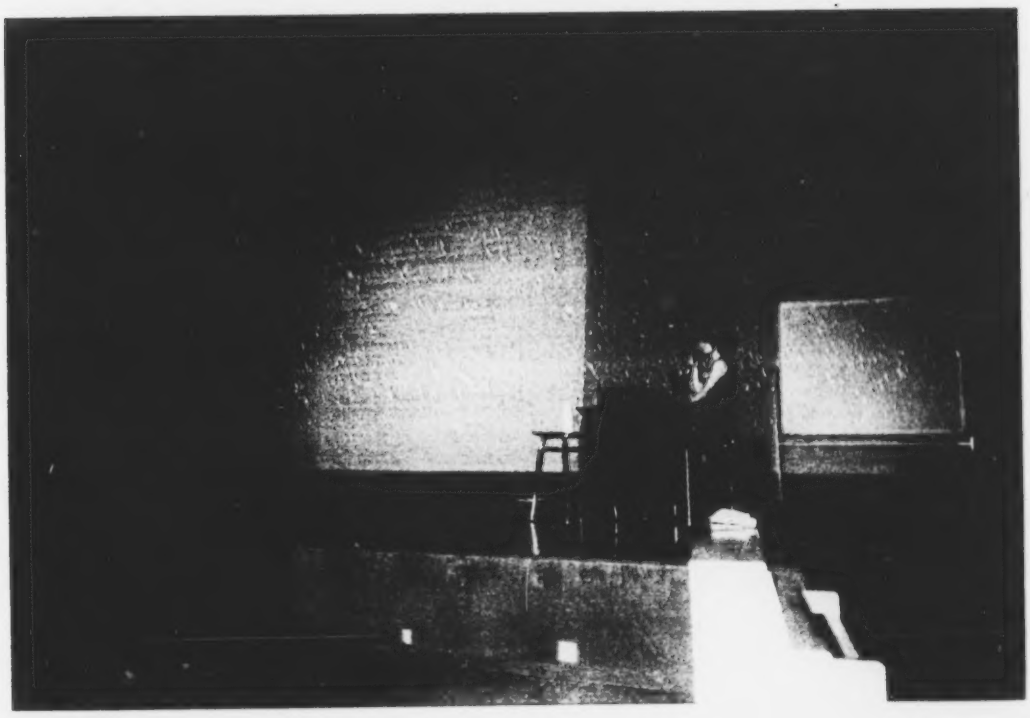
Respondents believed the program helps to fulfill New York State Education Standards in the following ways:

- it meets the Math, Science, Technology initiative,
- students can obtain Regents credit but it is an additional science course not a replacement science course, and
- research is a component of the standards.

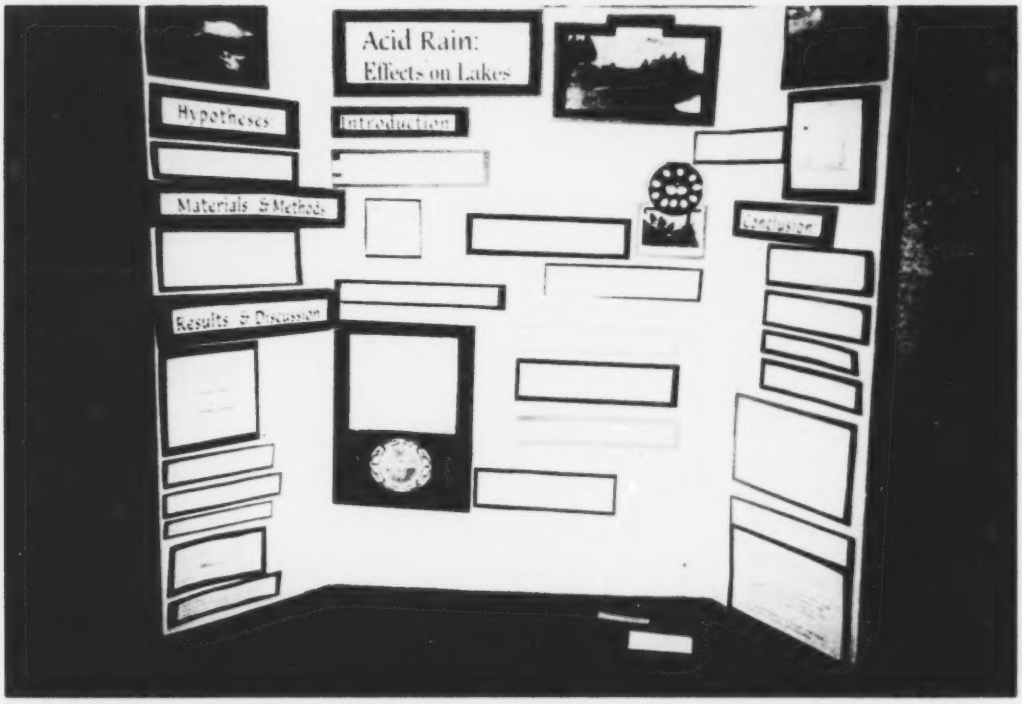
When asked how it meets the needs of the student body as a whole, some administrators believed that the Science Research Program was geared for a specific sector of students and by its nature can not be a large program. Another commented that it has the potential to foster greater respect and interest for science in the total student body. In one school system, the symposium was reproduced for the faculty so that they could become more aware of the use of technology.

The Science Research Program expands the high school science curriculum by adding a unique elective which addresses the often neglected research component. In addition, it is reported by participants reported that the program not only improves students' cognitive skills and knowledge of science, but also their work habits and personal attributes. Its continued implementation stands to further develop the scientific community.

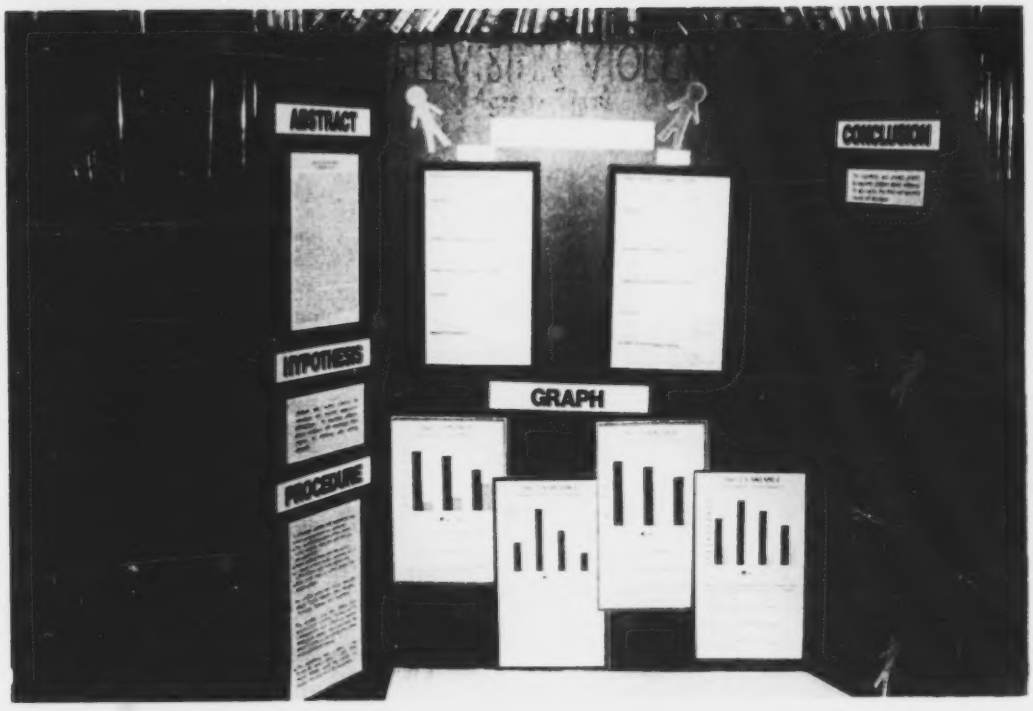




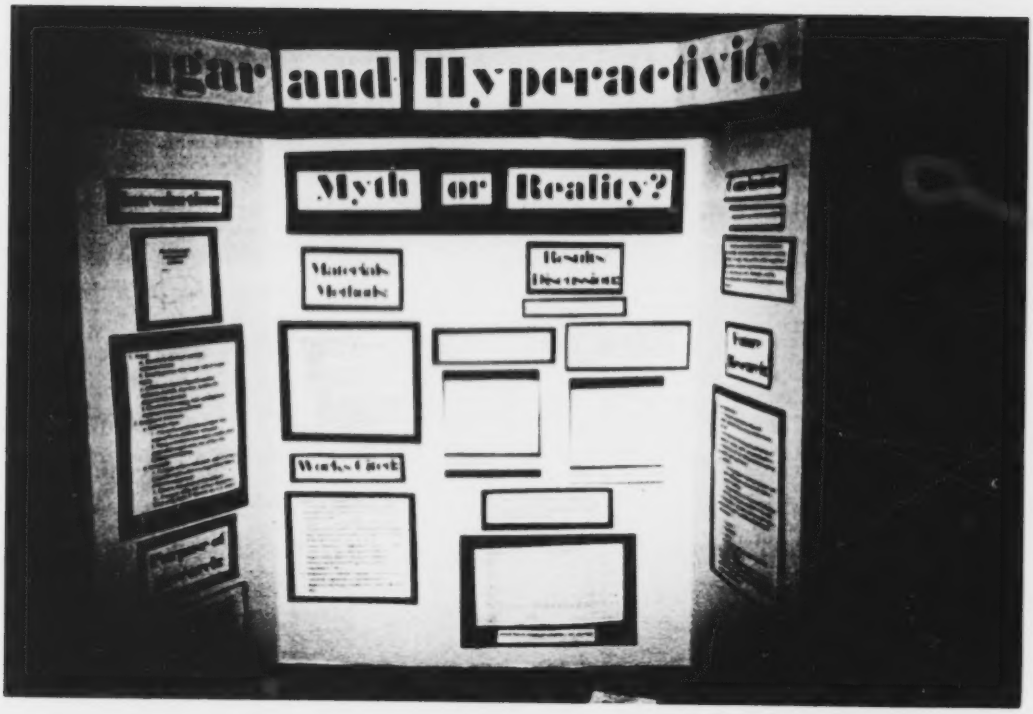
BEST COPY AVAILABLE

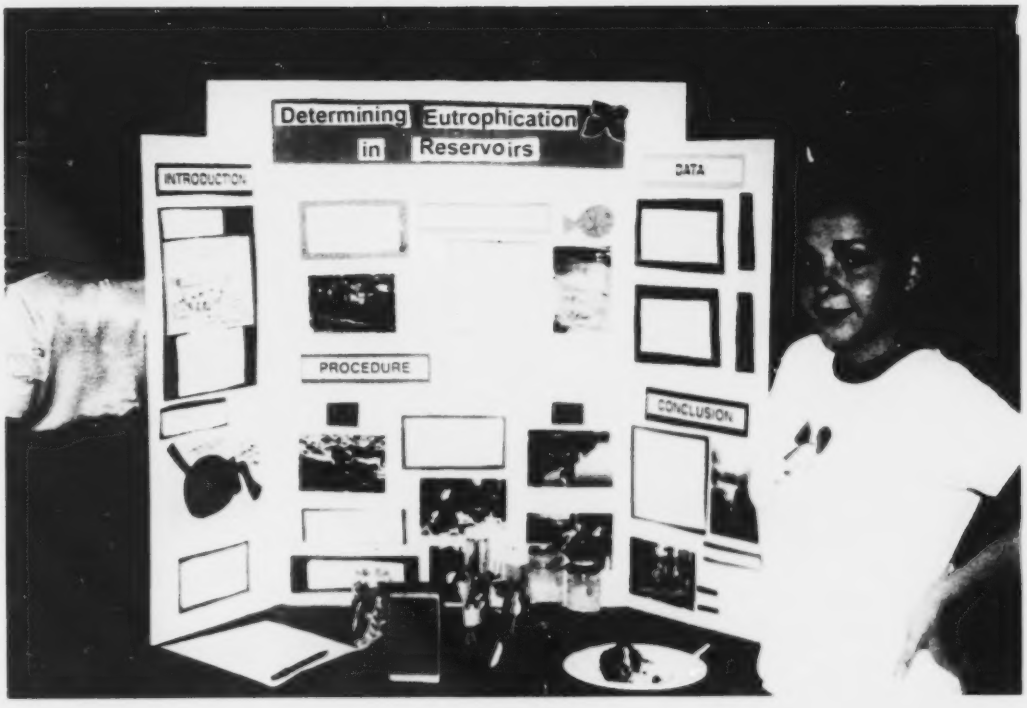


BEST COPY AVAILABLE



BEST COPY AVAILABLE





BEST COPY AVAILABLE

Appendix A
Student, Teacher and Administrator Surveys

School District: _____

Student Survey of Science Research Program

As part of an effort to evaluate the Science Research Program, we are collecting perceptions about the effectiveness of the program. As a student involved in this program, your input is very important to us. Please read each of the following questions and provide us with your response. To maintain the confidentiality of your response, please place the survey in the accompanying envelope, seal it and return it to _____

****

About You

1. Gender: _____ Male _____Female
2. Grade: _____
3. Age: _____
4. Number of years in the Science Research Program: _____
5. Number of high school science courses you have already taken or are presently taking: _____
6. Number of high school math courses you have already taken or are presently taking: _____
7. Are you currently taking another science course this year besides the Science Research Program? _____ If Yes, what is name of the course? _____

Enrolling in the Science Research Program

1. How did you find out about the Science Research Program?

2. With whom did you talk when you were making the decision to enter the Science Research program? Please check all that apply.

_____ 1. Parents/Caregivers
_____ 2. Teachers
_____ 3. Peers
_____ 4. Administrators
_____ 5. School Counselors
_____ 6. Other: _____

3. Why did YOU decide to enter the program?

About the Science Research Program

The following statements are about the Science Research Program. Please indicate your level of agreement with each statement by circling the number that best represents your opinion.

1=strongly agree; 2=agree; 3=slightly agree; 4=slightly disagree; 5=disagree; 6=strongly disagree

	Agreement Scale					
	SA					SD
1. The program has improved my knowledge about conducting science research	1	2	3	4	5	6
2. The program has increased my knowledge about science.	1	2	3	4	5	6
3. The program is interesting to me.	1	2	3	4	5	6
4. The program has helped to improve:						
a. my creative thinking ability.	1	2	3	4	5	6
b. problem solving skills	1	2	3	4	5	6
c. my communication skills.	1	2	3	4	5	6
d. my time management skills.	1	2	3	4	5	6
5. Due to the program, my motivation for learning has increased for:						
a. science	1	2	3	4	5	6
b. other school subjects	1	2	3	4	5	6
6. My self-esteem has increased due to the program.	1	2	3	4	5	6
7. The class size is good.	1	2	3	4	5	6
8. The program challenges me.	1	2	3	4	5	6

Please check any of the following that you have learned or improved through participation in the Science Research Program.

_____reading for meaning
_____problem solving
_____reasoning skills
_____writing a report/abstract
_____organization and planning skills
_____thinking creatively
_____communicating effectively orally
_____communicating effectively in writing
_____identifying the difference between a fact and an opinion
_____making an inference - using an observation to make a prediction
_____anticipating possible problems and finding the solution
_____effective use of technology
_____interpretation of data
_____real life application of science
_____outlining or notetaking
_____summarizing or paraphrasing
_____collecting data
_____reading graphs and charts
_____time management

About your teacher and mentor

Please indicate the level of support you received from your teacher and mentor in each of the following areas. Circle the number that best represents your opinion using the following scale.

1=high level of support; 2=average level of support; 3=low level of support; 4=not applicable

Sophomore year	Teacher	Mentor
1. mastering DIALOG computer searches	1 2 3 4	1 2 3 4
2. locating and retrieving 20 articles using DIALOG	1 2 3 4	1 2 3 4
3. presenting one of the 20 articles to class	1 2 3 4	1 2 3 4
4. developing statement of intended research	1 2 3 4	1 2 3 4
5. contacting author(s) of retrieved articles to begin mentor relationship	1 2 3 4	1 2 3 4
6. locating a research facility	1 2 3 4	1 2 3 4
7. creating five timelines	1 2 3 4	1 2 3 4
8. creating posterboard detailing intended research and initial findings	1 2 3 4	1 2 3 4
9. beginning research	1 2 3 4	1 2 3 4

If you are in your second year of the Science Research Program (Junior year), please continue with items 10-15. If not, please go to item 16.

Junior year	Teacher	Mentor
10. sustaining bi-monthy communication with mentor	1 2 3 4	1 2 3 4
11. continuing literature reviews at a rate of approximately 20 per year	1 2 3 4	1 2 3 4
12. redefining hypothesis based on literature review	1 2 3 4	1 2 3 4
13. presenting findings to teacher, the class, and school community	1 2 3 4	1 2 3 4
14. orientation to statistical software	1 2 3 4	1 2 3 4
15. constructing five time lines	1 2 3 4	1 2 3 4

16. In which of the above areas would you have liked more assistance (indicate area number)?

About your future plans

1. What would you like to be doing 6 months after high school?

2. What would you like to be doing 5 years after high school?

3. Do you plan to go to college? If so, what do you plan to study?

Other comments about the program?

Thank you.

School District: _____

Teacher Survey of Science Research Program

As part of an effort to evaluate the Science Research Program, we are collecting perceptions about the effectiveness of the program. As a teacher involved in this program, your input is very important to us. Please read each of the following questions and provide us with your response. To maintain the confidentiality of your response, please place the survey in the accompanying envelope, seal it and return it to _____.

****

Gender: _____ Male _____Female

Ethnicity: _____

Number of Years in Teaching: _____

Number of Years Teaching in the Science Research Program: _____

Support for the Science Research Program

The following are areas in which you may have received support for the implementation of the Science Research Program. For each, please circle the number indicating the level of support you have received.

	Outstanding	Sufficient	Insufficient	No Support
1. Adjustment of teacher load.	1	2	3	4
2. Establishment of communication networks.	1	2	3	4
3. Teacher computer for DIALOG, email, and internet.	1	2	3	4
4. Long distance phone line.	1	2	3	4
5. Course list in course catalog.	1	2	3	4
6. Support from other teachers.	1	2	3	4
7. Support from school counselors.	1	2	3	4
8. Support from administrators.	1	2	3	4
9. Support from mentors in the community.	1	2	3	4
10. Support from parents.	1	2	3	4

Training

Three basic types of training support were to be available to you under this program. For each type listed below, please circle the number indicating the degree of assistance it gave you for teaching the Science Research Program.

	Outstanding	Sufficient	Insufficient	No Support
1. Orientation sessions	1	2	3	4
2. Summer training session	1	2	3	4
3. Support group meetings	1	2	3	4

Are there areas in which you would have liked additional training and support? If so, in what areas and in what form, would you have liked that support?

Selection/Retention Process

For each facet of the selection/retention process, circle the number indicating your impression of how well the process is functioning

	Working Well	Is Adequate	Needs Extra Work	Not Area of Emphasis
1. Recruitment of teacher into the program	1	2	3	4
2. Identification of prospective students for the program	1	2	3	4
3. Spring recruitment meeting Freshman year	1	2	3	4
4. Student application process	1	2	3	4
5. Fall meeting with students	1	2	3	4
6. Process of retaining students in program.	1	2	3	4

When recruiting students, what would you say are the three most important characteristics for them to possess if they are to-enroll in the program?

How important is the student's previous academic experience in science in the selection process?

Communications

Please rate your perception of the communication amongst the various program participants.

	Outstanding	Sufficient	Insufficient	Not Happening
1. Student & Teacher	1	2	3	4
2. Student & Mentor	1	2	3	4
3. Teacher & Mentor	1	2	3	4
4. Teacher & Administrator	1	2	3	4
5. Teacher & School Counseor	1	2	3	4
4. School & Parent	1	2	3	4

Are there any specific areas in which you would like to see communication improve?

About the Science Research Program

The following statements are about the Science Research Program. Please indicate your level of agreement with each statement by circling the number that best represents your opinion.

1=strongly agree; 2=agree; 3=slightly agree; 4=slightly disagree; 5=disagree; 6=strongly disagree

	Agreement Scale					
	SA					SD
1. The program has improved students' knowledge about conducting science research	1	2	3	4	5	6
2. The program has increased students' knowledge about science.	1	2	3	4	5	6
3. The program is interesting to teach.	1	2	3	4	5	6
4. The program has helped students' to improve:						
a. creative thinking ability.	1	2	3	4	5	6
b. problem solving skills	1	2	3	4	5	6
c. communication skills	1	2	3	4	5	6
d. time management skills	1	2	3	4	5	6
5. Due to the program, student motivation for learning has increased for						
a. science	1	2	3	4	5	6
b. other school subjects	1	2	3	4	5	6
6. Students' self-esteem has increased due to the program.	1	2	3	4	5	6
7. The class size is appropriate.	1	2	3	4	5	6
8. The program challenges students.	1	2	3	4	5	6
9. The program has changed the concept of science education	1	2	3	4	5	6
10. I support continuation of the program	1	2	3	4	5	6

Please check any of the following that you believe students have learned or improved as a direct result of participation in the Science Research Program.

_____reading for meaning
_____problem solving
_____reasoning skills
_____writing a report/abstract
_____organization and planning skill
_____thinking creatively
_____communicating effectively orally
_____communicating effectively in writing
_____identifying the difference between a fact and an opinion
_____making an inference - using an observation to make a prediction
_____anticipating possible problems and finding the solution
_____effective use of technology
_____interpretation of data
_____real life application of science
_____outlining or notetaking
_____summarizing or paraphrasing
_____collecting data
_____reading graphs and charts
_____time management

Of the above check-list, which do you think are most unique to this program?

Thank you.

School District: _____

Administrator Survey of Science Research Program

As part of an effort to evaluate the Science Research Program, we are collecting perceptions about the effectiveness of the program. As an administrator involved in this program, your input is very important to us. Please read each of the following questions and provide us with your response. To maintain the confidentiality of your response, please place the survey in the accompanying envelope, seal it and return it to _____

****

Gender: _____ Male _____Female

Ethnicity: _____

Administrative Position: _____

Number of Years as an administrator: _____

Number of Years the Science Research Program has been in the district: _____

Support for the Science Research Program

The following are areas in which support may have been provided for the implementation of the Science Research Program. For each, please circle the number indicating the level of support provided or received.

	Outstanding	Sufficient	Insufficient	No Support
1. Adjustment of teacher load.	1	2	3	4
2. Establishment of communication networks.	1	2	3	4
3. Teacher computer for DIALOG, email, and internet.	1	2	3	4
4. Long distance phone line.	1	2	3	4
5. Course list in course catalog.	1	2	3	4
6. Support from other teachers.	1	2	3	4
7. Support from school counselors.	1	2	3	4
8. Support from administrators.	1	2	3	4
9. Support from mentors in the community.	1	2	3	4
10. Support from parents.	1	2	3	4
11. Support from school board.	1	2	3	4
12. Support from State Education.	1	2	3	4

Selection/Retention Process

For each facet of the selection/retention process, circle the number indicating your impression of how well the process is functioning.

	Working Well	Is Adequate	Needs Extra Work	Not Area of Emphasis
1. Recruitment of teachers into the program	1	2	3	4
2. Identification of prospective students for the program	1	2	3	4
3. Spring recruitment meeting Freshman year	1	2	3	4
4. Fall meeting with selected students	1	2	3	4
5. Process of retaining students in program	1	2	3	4

For what type of student is this program most appropriate?

How was the teacher who works with this program selected?

Communications

Please rate your perception of the communication amongst the various program participants.

	Outstanding	Sufficient	Insufficient	Not Happening
1. Student & Teacher	1	2	3	4
2. Student & Mentor	1	2	3	4
3. Teacher & Mentor	1	2	3	4
4. Teacher & Administrator	1	2	3	4
5. Teacher & School Counselor	1	2	3	4
6. School & Parent	1	2	3	4

About the Science Research Program

The following statements are about the Science Research Program. Please indicate your level of agreement with each statement by circling the number that best represents your opinion.

1=strongly agree; 2=agree; 3=slightly agree; 4=slightly disagree; 5=disagree; 6=strongly disagree

	Agreement Scale					
	SA					SD
1. The program has improved students' knowledge about conducting science research	1	2	3	4	5	6
2. The program has increased students' knowledge about science	1	2	3	4	5	6
3. The program is interesting to teach	1	2	3	4	5	6
4. The program has helped students' to improve:						
a. creative thinking ability	1	2	3	4	5	6
b. problem solving skills	1	2	3	4	5	6
c. communication skills	1	2	3	4	5	6
d. time management skills	1	2	3	4	5	6
5. Due to the program, student motivation for learning has increased for:						
a. science	1	2	3	4	5	6
b. other school subjects	1	2	3	4	5	6
6. Students' self-esteem has increased due to the program	1	2	3	4	5	6
7. The class size is appropriate	1	2	3	4	5	6
8. The program challenges students	1	2	3	4	5	6
9. The program has changed the concept of science education	1	2	3	4	5	6
10. I support continuation of the program	1	2	3	4	5	6

Please check any of the following that you believe students have learned or improved as a direct result of participation in the Science Research Program.

_____reading for meaning
_____problem solving
_____reasoning skills
_____writing a report/abstract
_____organization and planning skills
_____thinking creatively
_____communicating effectively orally
_____communicating effectively in writing
_____identifying the difference between a fact and an opinion
_____making an inference - using an observation to make a prediction
_____anticipating possible problems and finding the solution
_____effective use of technology
_____interpretation of data
_____real life application of science
_____outlining or notetaking
_____summarizing or paraphrasing
_____collecting data
_____reading graphs and charts
_____time management

Of the above check-list, which do you think are most unique to this program?

How do you see this program impacting your overall curriculum and resources?

Thank you.

Appendix B

Student, Teacher and Administrator Interview Protocols

Science Research Program
Student Interview Protocol

School District: _____
Years with Science Research Program: _____
Grade: _____ Gender: _____ Ethnicity: _____
Interviewer: _____
Date of interview: _____

Interview overview:

- probe for detail; get specific examples
- search for meanings, interpretations, perceptions on part of interviewee

Potential probes:

- barriers
- supports
- contrast ideal and current reality
- factors that prevent ideal; are these doable, in your control

Questions:

- If you were to tell another student about the SRP, how would you describe it?
- What is the Program's purpose, goals, and who should take it?
- How did you become involved in the Program?
- What was interesting about it?
- How did you find out about it?
- How were you picked to be a part of the Program? What did you have to do?
- What benefits or opportunities does this class provide that other science classes don't?
- How is this class different from your other classes, in general?
- Have your future plans changed as a result of your involvement with the program, i.e., has this course influenced your intended area of specialization in college, or work interests?
- Describe your experience in the course and conducting research.
- What joys did you experience? Frustrations?
- Of your sophomore year activities, which were easy for you and which were hard, i.e., mastering DIALOG, literature review, presenting articles, hypothesis generation, starting mentor relationship?
- Of your junior year activities, which were easy and which were hard, i.e., communicating with mentor, continued literature review, meeting with teacher, presentation of initial findings, introduction to statistical hardware?
- Describe the degree of assistance you have received from your teacher and also your mentor. What kinds of help did you get? In what areas would you like additional help?

Science Research Program

Teacher Interview Protocol

School District: _____

Years with Science Research Program: _____ Years Teaching: _____

Grade: _____ Gender: _____ Ethnicity: _____

Interviewer: _____

Date of interview: _____

Interview overview:

- probe for detail; get specific examples
- search for meanings, interpretations, perceptions on part of interviewee

Potential probes:

- barriers
- supports
- contrast ideal and current reality
- factors that prevent ideal; are these doable, in your control

Questions:

- If you were to tell another teacher about the SRP, how would you describe it?
- What is the program's purpose, goals and whom does it serve?
- How did you get students recruited and selected into the program?
- What do you see as the key components of the course curriculum?
- How is student progress assessed? Describe a biweekly meeting (progress checklist, portfolio review)
- What are the benefits of the program for the student?
- Now that our are one/two years into the program, how useful was the summer training?
  What did you learn that you were able to utilize in the classroom?
  In what areas would you have liked more information?
  What single item was the most helpful?
  What would you change about the workshop, either format or content?
- How useful have the teacher support group meetings been?
  What have you learned that you have been able to utilize?
  In what areas do you continue to need more information?
- What single item was the most helpful?
- How would you change the meetings, either format or content?
- What is the degree of support for the program you have experienced from your district? Administration? Home department? Peers or other teachers? Parents and the community?
- How well is the program integrated into your building and school curriculum?
- On a day-to-day basis, what activities hinder or facilitate the implementation of the program?

Science Research Program

Administrator Interview Protocol

School District: _____ Position: _____

Years with district: _____

Gender: _____ Ethnicity: _____

Interviewer: _____

Date of interview: _____

Interview overview:

- probe for detail, get specific examples
- search for meanings, interpretations, perceptions on part of interviewee

Potential probes:

- barriers
- supports
- contrast ideal and current reality
- factors that prevent ideal, are these doable, in your control

Questions:

- If you were to tell another administrator about the SRP, how would you describe it?
- What is the program's purpose, goals, and who does it serve?
- How are students recruited and selected for the program?
- What kinds of students are participating?
- Who is best served by the program?
- How is this program meeting the needs of the student body as a whole?
- What is the impact of student attrition from the program?
- What changes have been made to implement the program? What is yet to be provided?
- What are the advantages and drawbacks of the program?
- What is the long-term viability of the program?
- How has the program impacted your overall science curriculum?
- How does the program fit in with NYS educational standards?
- How is the program different from others classes that are offered?

Appendix C
Symposia Observation Form

Science Research Program
Symposium Observation

School District: _____
Date of Symposium: _____
Name of Observer: _____
Number of students in the program: _____
Number of students participating in the symposium: _____
People attending the symposium:
___ parents ___ classmates ___ mentors ___ school board
___ siblings ___ teachers ___ administrators ___ other: _____

Format of the student presentations

Oral Presentations
Number of oral presentations: _____
Approximate length of oral presentations: _____ minutes Comments:
Did the students use slides and/or graphic analyses in their presentations? Yes No
Did the students clearly convey their

purposes?	Yes	No
materials?	Yes	No
methods?	Yes	No
results?	Yes	No
discussions?	Yes	No
conclusions?	Yes	No

Poster Presentations
Number of poster presentations: _____ Comments:
Was the information presented word-processed? Yes No
Did the students use slides and/or graphic analyses in their presentations? Yes No
Did the students clearly convey their

purposes?	Yes	No
materials?	Yes	No
methods?	Yes	No
results?	Yes	No
discussions?	Yes	No
conclusions?	Yes	No

Goals

Strongly Agree = 1, Agree = 2, Disagree = 3, Strongly Disagree = 4

Based on the presentations, did the students

1) use the scientific method?	1	2	3	4
2) draw conclusions based on data?	1	2	3	4
3) propose future research?	1	2	3	4
4) conduct literature searches?	1	2	3	4
5) conduct authentic experimentation which addresses hypotheses, is reproducible and has appropriate controls?	1	2	3	4
6) collect, organize, analyze and interpret data?	1	2	3	4
7) work with a professional mentor?	1	2	3	4

Other Comments/Observations (continue on back)

Appendix D
Cover Letter for Surveys
Confirmation Letter for Site Visits

Evaluation Consortium at Albany
School of Education

Education B10
Albany, New York 12222

518/442-5027

UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

June 2, 1997

Dear Teacher,

We have been contracted to gather information regarding the Science Research Program in various school districts in New York state. As a district that has participated in the National Science Foundation training, your input is integral to this endeavor. We are interested in obtaining the impressions of the stakeholders in this program. To that end, we have enclosed surveys to be completed by all students in the program, as well as the teacher and administrators involved. We have provided copies of the surveys. Please make additional copies as necessary.

In addition, we would appreciate your assistance in gathering the following information that is important to the evaluation process.

1. course outlines
2. recruitment brochures/handouts
3. support group meeting minutes (if available)
4. demographic information of the students and teachers in your district and the program (please use attached form)

Thank you for your efforts in gathering the above information. Please return the surveys and supporting materials in the enclosed envelope by June 16, 1997. Should you have any questions, please feel free to call us at (518) 442-5027.

Sincerely,

Lucy Cardella
Laura Zebrowski

Evaluation Consortium at Albany
School of Education

Education B10
Albany, New York 12222

518/442-5027

UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

June 2, 1997

Dear Teacher,

We appreciate the opportunity to observe the Science Research Program at your school and to meet with the participants. Per our telephone conversation, our visit is scheduled for June 11, 1997. We anticipate arriving at 11:00 a.m.

During our visit, we would like to interview the following people to gather their perceptions of the program:

1. you, the Science Research Program Teacher
2. the Building Administrator (or a central administrator or science department chairperson, if the principal is not available)
3. at least one group of 3 to 4 students involved in the program

We anticipate that these interviews will last 45 minutes to one hour.

In addition, we would like an opportunity to view the students portfolios as well as the class in session. Your support in gathering the following information would greatly assist us in the evaluation process:

1. course outlines
2. recruitment brochures/handouts
3. support group meeting minutes (if available)
4. demographic information of the students and teachers in your district and the program (see attached form)
5. the enclosed surveys to be completed by the students, teacher, and administrator

We appreciate your efforts in arranging the details of our visit and gathering this information. Should you have any questions, please feel free to call us at (518) 442-5027. We look forward to our visit.

Sincerely,

Lucy Cardella
Laura Zebrowski

Appendix E
Assessment Rubrics

Check Sheet for Research Course Implementation Success

School _____ Teacher _____

Date course began _____ Date of Assessment _____

Number of students in class: Year 1 ____ Year 2 ____ Year 3 ____

		Yes	No
1	Was there a spring meeting with prospective students and their parents (or if course implementation was too late for a spring meeting, was there a fall meeting)?		
2	By midyear, did the teacher begin a list of prospective students to recruit for the next year?		
3	Was the teacher available to students during the summer?		
4	Did new students have sufficient articles to discuss, from common literature, at the start of school (ten articles from assorted sources)?		
5	Were there five completed biweekly assessment sheets for each student, each quarter?		
6	Did the student/teacher conferences begin by the third week of school?		
7	Did each student complete three or more successful DIALOG searches, including author searches, by mid winter?		
8	Have all new studnets contacted a prospective mentor by April of their first year in the course?		
9	Did every student know his/her role in the upcoming symposium by mid-April?		
10	Were all sections of each student's portfolio kept up to date?		
11	Did the teacher provide opportunities for students to make out-of-class presentations on their topics?		
12	Did the teacher require students to attend available science symposia and presentations?		
13	Did each student produce a quality poster by the end of year one (includes graphics, word processing, layout)?		
14	Did students enroll for college credit in their second and third years?		
15	Did second and third year students enter competitions?		
16	Did every student participate in the end of year symposium?		

Science Research Program
Portfolio Review

School _____

Date _____

# of Portfolios Reviewed _____

Demographic Information _____

Contents	none	minimal	normative	superior	NA
• Lab Notebook	1	2	3	4	5
• Goal Sheets	1	2	3	4	5
• Email/Internet/DIALOG Log	1	2	3	4	5
• Journal Articles	1	2	3	4	5
• Telephone Log	1	2	3	4	5
• Meetings Log	1	2	3	4	5
• Assessment	1	2	3	4	5
• Grants	1	2	3	4	5
• Presentations	1	2	3	4	5
• Honors/Awards	1	2	3	4	5
• Abstracts	1	2	3	4	5
• Final Paper	1	2	3	4	5
• Rules for Competitions	1	2	3	4	5
• Log of Time Commitments	1	2	3	4	5
• Essay on Excellence	1	2	3	4	5
• Essay on Research Direct.	1	2	3	4	5

Impressions
General

Portfolio #1

Portfolio #2

Appendix F
Documentation Checklist
Demographic Profiles

School District _____

Documentation Required from Each Site Science Research Programs

____ Course Outlines

____ Recruitment Brochures/Handouts

____ Portfolio Checklists

____ Support Group Meeting Minutes (if available)

____ Demographics

- ____ District wide
- ____ Of students in the program & teachers in the program

____ Completed Surveys

- ____ Students
- ____ Teachers
- ____ Administrators

____ Completed Interviews

- ____ Students
- ____ Teachers
- ____ Administrators

School district: _____ Date: _____

County: _____

DEMOGRAPHIC PROFILES

DISTRICT - Student Enrollment

Total # _____

- % White _____
- % Black _____
- % Hispanic _____
- % Other _____
- % Male _____
- % Female _____

Youth at Risk

- Census Poverty Index _____
- % Free/Reduced Lunch _____
- % Limited English _____
- Dropout Rate _____
- Suspension Rate _____

High School Graduates

- 1995-1996 % Regents Diploma _____
- 1995-1996 % to College _____

Classroom Teachers

- Pupil to Teacher Ratio _____
- % Minority _____
- Median Years of Experience _____
- % Male _____
- % Female _____

SCIENCE RESEARCH PROGRAM - Students in Program

Total # _____

% White _____

%Black _____

%Hispanic _____

%Other _____

%Male _____

%Female _____

%with disabilities _____

%Limited English _____

%College Bound _____

%Regents Diploma Track _____

%Concurrently Taking Another Science Course _____

%Free/Reduced Lunch _____

Dropout Rate _____

Suspension Rate _____

Program Teachers

Pupil to Teacher Ratio _____

Ethnic Background

White _____

Black _____

Hispanic _____

Other _____

Years Teaching Experience _____

Gender _____